

This listing of claims will replace all prior versions, and listings, of claims in the application:

LISTING OF THE CLAIMS:

1. (Currently Amended) A method for provisioning in a computing utility infrastructure, the method comprising:

obtaining a Concrete Resource Model describing a desired resource structure of hardware and software resources and configuration of said resources, said Concrete Resource Model having nodes and edges, said nodes representing said resources and requirements on a state of said resources, said edges representing relationships between said resources, said edges being associated with a set of attributes, said attributes describing a type of a relationship and describing whether said relationship is fixed or dynamic, said attributes including color attributes, said color attributes indicating whether said relationship must exist or not, and said type of said relationship comprising one or more of: a first resource is a runtime container for a second resource, ~~a first resource is a federation of other resources including a second resource,~~ and a first resource includes a second resource and the first resource is a set of homogeneous resources; and

using the Concrete Resource Model to generate at least one provisioning action to create a matching resource structure in the computing utility infrastructure.

2. (Previously Presented) The method as recited in claim 1, wherein the step of using the Concrete Resource Model includes executing at least one phase comprised of a matching step and a configuring step, wherein the steps of matching and configuring are repeated until the

Concrete Resource Model is entirely matched with a set of at least one Resource Instance Service in a knowledge subsystem describing resources and organization of resources in the computing facility infrastructure.

3. (Previously Presented) The method as recited in claim 2, wherein the step of matching includes mapping every node in a subset of said nodes in the Concrete Resource Model to a Resource Instance Service in the knowledge subsystem, such that for every node in said subset, constraints on values of said attributes in said node are satisfied by the values of the same attributes in the corresponding Resource Instance Service, and the set of said relationships between said nodes in said Concrete Resource Model matches the set of relationships between the corresponding Resource Instance Services.

4. (Previously Presented) The method as recited in claim 2, wherein the step of configuring includes:

- collecting provisioning actions to a provisioning action set;

- selecting a provisioning action having all preconditions satisfied;

- executing the provisioning action;

- updating the knowledge subsystem with side effects of the provisioning action, said side effects of the provisioning action comprising: creating the relationships between the resources, destroying the relationships between the resources, and changing values of the attributes in corresponding Resource Instance Services; and

- repeating the steps of selecting and executing until all provisioning actions whose preconditions are satisfied are executed.

5. (Previously Presented) The method as recited in claim 2, wherein the step of configuring includes selecting a provisioning action from a provisioning action set having at least one precondition not satisfied, finding a different action to satisfy said at least one precondition; and adding said different action to said provisioning action set.

6. (Previously Presented) The method as recited in claim 4, further comprising obtaining said side effects of said provisioning action by at least one of:

- inspecting the definition of said provisioning action in said knowledge subsystem; and
- dynamically discovering the side effects once the action is executed by executing a discovery component.

7. (Previously Presented) The method as recited in claim 1, wherein the step of generating at least one provisioning action includes at least one task taken from a group of tasks consisting of:

- creating a new service environment;
- changing a combination of resources allocated to the service environment;
- changing the configuration of resources allocated to a service environment; and
- destroying a service environment ; and
- any combination of these tasks.

8. (Previously Presented) The method as recited in claim 7, wherein changing the configuration of resources allocated to a service environment includes at least one of:

- changing a local state of a resource; and

changing a way the resource is configured to work with other resources.

9. (Previously Presented) The method as recited in claim 1, further comprising regenerating provisioning instructions whenever at least one of the following occurs:

- infrastructure characteristics change; and
- requirements of the service change; and
- Provider's policy change.

10. (Previously Presented) The method as recited in claim 9, wherein infrastructure characteristics are taken from a group of characteristics consisting of:

- types of resources in the infrastructure;
- capabilities of said resources;
- configuration of said resources constraints on a configuration of said resources; and
- any combination of these characteristics.

11. (Cancelled)

12. (Previously Presented) The method as recited in claim 1, wherein said concrete resource model provides a set of resource manager methods taken from a group of resource manager methods consisting of:

- creating composite resources based on a Concrete Resource Model;
- changing composite resources based on a Concrete Resource Model;
- destroying composite resources based on a Concrete Resource Model; and
- any combination of these resource manager methods.

13. (Previously Presented) The method as recited in claim 1, wherein the step of using is executed according to an execution specification.

14. (Previously Presented) The method as recited in claim 13, wherein said execution specification is taken from a group of execution specifications consisting of:

execute immediately;

stored and executed later at least once; and

a combination of the above.

15. (Cancelled)

16. (Original) A program storage device readable by machine, tangibly embodying a program of instructions executable by the machine to perform method steps for provisioning in a computing utility infrastructure, said method steps comprising the steps of claim 1.

17. (Currently Amended) An apparatus for provisioning in a computing utility infrastructure, the apparatus comprising:

means for obtaining a Concrete Resource Model describing a desired resource structure of hardware and software resources and configuration of said resources, said Concrete Resource Model having nodes and edges, said nodes representing said resources and requirements on a state of said resources, said edges representing relationships between said resources, said edges being associated with a set of attributes, said attributes describing a type of a relationship and

describing whether said relationship is fixed or dynamic, said attributes including color attributes, said color attributes indicating whether said relationship must exist or not, and said type of said relationship comprising one or more of: a first resource is a runtime container for a second resource, ~~a first resource is a federation of other resources including a second resource,~~ and a first resource includes a second resource and the first resource is a set of homogeneous resources; and

means for using the Concrete Resource Model to generate at least one provisioning action to create a matching resource structure in the computing utility infrastructure.

18. (Original) A computer program product comprising a computer usable medium having computer readable program code means embodied therein for causing provisioning in a computing utility infrastructure, the computer readable program code means in said computer program product comprising computer readable program code means for causing a computer to effect the functions of claim 17.

19. (Previously Presented) The method as recited in claim 2, wherein said at least one phase is a Concrete Model Processing Engine phase, the Concrete Model Processing Engine phase, comprising:

receiving requests in the form of a Concrete Resource Model describing a desired resource structure; and

generating provisioning actions for reaching a state that satisfies the requirements specified in the Concrete Resource Model.

20. (Previously Presented) The method as recited in claim 1, wherein the steps of obtaining and using are performed by at least one user taken from a group of users consisting of:

- a service provider;
- an enterprise owning an infrastructure used for running at least one application;
- a customer of a service provider;
- a company owning an IT infrastructure; and
- a utility provider.

21. (Previously Presented) The method as recited in claim 20, wherein at least one of said at least one user provides operational constraints dictating acceptable variations.

22. (Previously Presented) The method as recited in claim 2, wherein all edges that represent fixed relationships with the nodes as endpoints in the Concrete Resource Model match a set of fixed relationships of a matching Resource Instance Service in terms of type of the fixed relationships, direction of the fixed relationships and matching endpoint nodes.

23. (Previously Presented) The method as recited in claim 2, wherein for every edge representing a dynamic relationship in the Concrete Resource Model, the at least one provisioning action establishes a relationship in the knowledge subsystem if the relationship does not exist in the knowledge subsystem.

24. (Previously Presented) The method as recited in claim 2, wherein for every node in the Concrete Resource Model, for every attribute whose value is different from value of an attribute

in a matching Resource Instance Service, the at least one provisioning action is performed on the matching Resource Instance Service to change the value of the attribute in the matching Resource Instance Service.